



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**  
**BEFORE THE BOARD OF APPEALS AND PATENT INTERFERENCES**

**In re the IRAJ PARCHAMAZAD Patent Application**

**Serial No.** 09/973,287      **Examiner:** Ridley, Basia Anna

Filed: October 5, 2001 Art Unit: 1764

**For: PORTABLE COGENERATION FUEL-CELL POWER GENERATOR  
WITH HIGH-YIELD, LOW PRESSURE REFORMER FOR  
RECREATIONAL VEHICLES**

Atty. Dkt. No. F99182

Mail Stop – APPEAL BRIEF PATENTS  
Honorable Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

## **APPELLANT'S OPENING BRIEF ON APPEAL**

Sir:

Appellant hereby appeals to the Board of Appeals and Patent Interferences from the PTO's April 11, 2007, final rejection of claims 1 to 4. Claim 1 is independent; claims 2, 3, and 4 are each dependent from claim 1. No claim is allowed.

Appellant timely filed his notice of this appeal on June 12, 2007. Appellant does not seek a hearing.

The real party in interest on this appeal is appellant's assignee, Clean Fuel Generation LLC, a limited liability California corporation with a place of business at 1911 San Vicente Boulevard, Suite 375, Los Angeles, CA 90049. There is no related appeal or interference, to our knowledge. There is no amendment filed after the PTO's final rejection.

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### **SUMMARY OF CLAIMED SUBJECT MATTER**

Claim 1, the only independent claim, calls for an apparatus called a reformer that converts a mixture of low-pressure hydrocarbon gas, such as propane, and steam, into hydrogen, thus forming a fuel for a proton-exchange fuel cell. See the specification, 5:7-11 and Fig. 1, reference numerals 5, 6, and 7. The reformer comprises a cylinder with a cap at each end, and is loosely packed with a palletized catalyst. At one end of the cylinder is a fuel tube having an outflow end that is coupled to the cylinder. At the other end of the cylinder is an outwardly-protruding outflow tube. See the specification, 5:7-20 and Fig. 1, reference numerals 5, 6, 7, 20, 21, and 22.

A hydrocarbon gas, e.g., propane, is introduced into one end of the cylinder at low pressure through this fuel tube. Coaxial with the fuel tube is a steam tube that surrounds the fuel tube. The two coaxial tubes concurrently introduce low-pressure hydrocarbon gas, and steam, at a pressure higher than the pressure of the hydrocarbon gas, into the cylinder. The steam tube has a tip at its outflow end that is gradually reduced in diameter over its length to form a truncated conical tip. The fuel tube has a substantially open end coincident with, and of smaller diameter than the diameter of the steam tube. The steam tube is formed to draw the hydrocarbon gas along with the steam into the cylinder, and to direct the steam in a path that is at an acute angle with the path of the fuel, such that the steam flow crosses the fuel path at an acute angle from all radial direction. See the specification, 5:20-6:2 and Fig. 2, reference numerals 27', 28', 29, 27, 28, 26, and 30.

Claim 2, which is dependent from claim 1, specifies that the fuel tube has a tip of given length at its outflow end that is reduced in diameter gradually along that given length. See the specification, 5:25-6:7 and Fig. 2, reference numerals 27, 28, and 30.

### **GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

In the January 11, 2007, final rejection, at page 3, the PTO objected to claims 1-4 because claim 1, at line 14, includes the word "and" after the words "being formed." The word "and" is unnecessary in claim 1, line 14, and should be deleted.

In the same final rejection, at pages 4-5, the PTO rejected claim 1 as allegedly anticipated by U. S. Patent 3,718,506(the "506 patent"), or, if not anticipated, unpatentable for alleged obviousness in view of the '506 patent. The PTO cited in particular Fig. 2 of the '506 patent, showing cylinder 13 with a catalyst bed therein, fuel tube 3', steam tube 3a', and stated that Fig.2 shows a steam tube formed to draw hydrocarbon gas into mixture with steam, and to direct steam in a path that is at an acute angle with the path of fuel outflow, the fuel flow path lying substantially along the axis of the coaxial fuel and steam tubes, and that crosses the fuel path at an acute angle from all radial directions.

The PTO rejected claim 2 for anticipation or obviousness, asserting that Fig. 2 of the '506 patent shows fuel tube 3' with a tip of given length at its outflow end that is reduced in diameter gradually along the given length.

The PTO rejected claim 3 for anticipation or obviousness, asserting that Fig. 2 of the '506 patent inherently discloses storing liquefied propane.

The PTO rejected claim 4 for anticipation or obviousness, asserting that Fig. 2 of the '506 patent discloses heat source 10' around cylinder 13 for heating the catalyst.

The PTO also asserted, at page 5, third paragraph, that limitations directed to the manner of operating the claimed apparatus, or to the material or article worked upon, do not differentiate the apparatus from the '506 patent in particular, or from the prior art in general.

## ARGUMENT

### The '506 Patent Does Not Anticipate Claim 1 on Appeal

Claim 1 calls for a reformer, an apparatus that converts a mixture of gaseous hydrocarbons and steam into hydrogen, and delivers the hydrogen to a proton-exchange fuel cell. Claim 1 states that the reformer includes a steam tube coaxial with and surrounding a fuel tube for concurrently introducing hydrocarbon gas and steam at a pressure higher than the pressure of the hydrocarbon gas at one end of a cylinder, with the steam tube having a tip at its outflow end that is gradually reduced in diameter over its length to form a truncated conical tip, and the fuel tube having a substantially open end coincident with, and of smaller diameter than the steam tube diameter. The '506

patent does not disclose, or refer to, a fuel tube or a steam tube that have these claimed structures, though the PTO apparently infers, using impermissible hindsight and appellant's disclosure, the presence of such structures from the depiction of tubes 3a' and 3' in Fig. 2 of the '506 patent.

Claim 1 also states that the steam tube is formed to draw the hydrocarbon gas with the steam, **and to direct the steam in a path that is at an acute angle with the path of the fuel**, with the fuel flow path lying substantially along the axis of the coaxial fuel and steam tubes, and with the steam flow crossing the fuel path at an acute angle from all radial directions. The '506 patent does not disclose that steam in tube 3a' is drawn into the path of the hydrocarbon fuel flow from tube 3' **at an acute angle from all radial directions**. The final rejection asserts, at page 5, that the '506 patent discloses this structure, but does not pinpoint where in the '506 patent that the disclosure is. Appellant cannot find this disclosure anywhere in the '506 patent. There is no basis for asserting inherent disclosure of this claimed structural feature in the '506 patent because the structure and its effects on steam flow arise in part from the pressure differential between the fuel flow and the steam flow.

Since the '506 patent does not disclose at least two elements of claim 1, the '506 patent does not anticipate claim 1, or any of claims 2, 3, or 4, since all are dependent on claim 1.

### **The '506 Patent Does Not Render Claim 1 Unpatentable for Obviousness**

The PTO's argument for obviousness rests on the same improper assumption as its argument for anticipation, namely, that the '506 patent discloses, or suggests, that steam in tube 3a' is drawn into the path of the hydrocarbon fuel flow from tube 3' at an acute angle from all radial directions. There is no basis for asserting disclosure of this claimed structural feature in the '506 patent, inherently or otherwise, at least in part because the structure and its effects on steam flow arise in part from the pressure differential between the fuel flow and the steam flow.

### **The '506 Patent Does Not Render Claim 2 Unpatentable for Obviousness**

Claim 2 specifies that the fuel tube has a tip of given length at its outflow end that is reduced in diameter gradually along that given length. The '506 patent states nothing

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**Appellant's Opening Brief on Appeal**

Patent Examiner: Ridley, Basia Anna  
Art Unit: 1764  
Title: PORTABLE COGENERATION FUEL-CELL  
POWER GENERATOR WITH HIGH-YIELD, LOW  
PRESSURE REFORMER FOR RECREATIONAL  
VEHICLES

about the structure of fuel nozzle 3' in Figure 2, not even that it is the same as nozzle 3 in Figure 1 of the '506 patent. Regarding nozzle 3 in Fig. 1 of the '506 patent, the '506 patent states only that it is "so dimensioned" to introduce more recycled combustion gas than fresh propane into the mixture delivered to the fuel cell in Fig. 1 of the '506 patent. Appellant's claims do not refer to, or call for delivering recycled combustion gas to either the stem tube or the hydrocarbon tube.

### CONCLUSION

The Board should reverse the PTO's final rejection of claims 1 to 4.

Dated: October 20, 2008

Respectfully submitted,



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### CLAIMS ON APPEAL APPENDIX

1. A reformer for a mixture of low-pressure hydrocarbon gas and steam for fueling a proton-exchange fuel cell with hydrogen from said mixture, comprising:
  - a cylinder loosely packed with a palletized catalyst with a cap at each end,
  - a fuel tube having an outflow end coupled to said cylinder for introducing said hydrocarbon gas into one end of said cylinder at low pressure,
  - a steam tube coaxial with and surrounding said fuel tube for concurrently introducing said hydrocarbon gas and steam at a pressure higher than the pressure of said hydrocarbon gas at said one end of said cylinder, said steam tube having a tip at its outflow end that is gradually reduced in diameter over its length to form a truncated conical tip, said fuel tube having a substantially open end coincident with, and of smaller diameter than said steam tube diameter, and,
  - an outflow tube protruding outwardly from said cylinder at an end of said cylinder opposite said one end,
  - said steam tube being formed and to draw said hydrocarbon gas with said steam, and to direct said steam in a path that is at an acute angle with the path of said fuel outflow, said fuel flow path lying substantially along the axis of said coaxial fuel and steam tubes, and that crosses said fuel path at an acute angle from all radial directions.
2. A hydrocarbon gas and steam reformer as defined in claim 1 wherein said fuel tube has a tip of given length at its outflow end that is reduced in diameter gradually along said given length.
3. A hydrocarbon gas and steam reformer as defined in claim 1 where said hydrocarbon gas is low pressure propane, stored as liquefied propane in a container on aboard recreational vehicles.
4. A hydrocarbon gas and steam reformer as defined in claim 1 including a heat source around said cylinder for heating said catalyst.